

Claims

1. An LED printing system including:
 - a data source (S) for providing original data;
 - a printer controller (C) for processing the original data; and
 - an LED printer head (H) for printing the processed data without further processing them.
2. The LED printing system of claim 1 wherein the printer controller (C) includes a calibration data memory (30) for storing calibration data of the LED printer head (H) and a dither block (12) for dithering the original data based on the calibration data.
3. The LED printing system of claim 2 wherein the printer controller (C) includes a multiplier (14) for multiplying the original data with the calibration data before sending them to the dither block (12).
4. The LED printing system of claim 2 wherein the printer controller (C) includes a threshold memory (40) for storing thresholds and a multiplier (14) for multiplying the thresholds with the calibration data before sending them to the dither block (12).
5. The LED printing system of claim 1 wherein the printer controller (C) includes:
 - a first adder (15) connected with the data source (S);
 - a threshold block (T) connected with the first adder (15);
 - a second adder (17) connected with the first adder (15);
 - a multiplexer (16) connected with the second adder (17);
 - a calibration data memory (30) connected with the multiplexer (16);
 - an error memory (18) connected with the second adder (17); and

1 □ a calculation block (22) connected with the error memory (18) on
2 one hand and connected with the first adder (15) on the other
3 hand;
4 □ wherein an original datum of a current dot is sent from the data
5 source (S) to the first adder (15), and errors of related previous
6 dots are sent from the error memory (18) to the calculation block
7 (22) in which a weighted error sum is calculated based on the
8 errors, and the weighted error sum is sent to the first adder (15) in
9 which the original datum and the weighted error sum are added
10 up so as to render a sum, and the sum is sent to the threshold
11 block (T) in which the sum is compared with a threshold, and an
12 output is set to be a first value if the sum is greater than threshold
13 and a second value if otherwise, and the output is sent to the LED
14 printer head (H) in order to control the on/off of a current LED
15 corresponding to the current dot, and the sum is sent to the
16 second adder (17) in which an error of the current dot is
17 calculated, and the error of the current dot is set to be the sum
18 minus the output minus a function of the error of the current LED
19 if the sum is greater than the threshold and the sum minus the
20 output if otherwise, and the error of the current dot is sent to the
21 error memory (18).

22 6. The LED printing system of claim 5 wherein the related previous dots
23 are the upper left, upper, upper right and left dots.

24 7. The LED printing system of claim 5 wherein the weighted error sum
25 is provided via multiplying the error of each previous dot with a
26 specific coefficient so as to render a weighted error and adding up the

1 weighted errors.

2 8. The LED printing system of claim 5 wherein the first value of the
3 output is 1, and the second value of the output is 0.

4 9. The LED printing system of claim 1 wherein the printer controller (C)
5 includes:

- 6 □ a dither block (12) connected with the data source (S);
- 7 □ a first adder (15) connected with the dither block (12);
- 8 □ a latch (50) connected with the first adder (15);
- 9 □ a second adder (17) connected with the latch (50) on one hand
10 and the first adder (15) on the other hand;
- 11 □ an error prediction block (32) connected with the latch (50); and
- 12 □ a calibration data memory (30) connected with the error
13 prediction block (32);
- 14 □ wherein source data are sent from the data source (S) to the dither
15 block (12) in which the source data are dithered, and the dithered
16 data are sent to the first adder (15) in which the dithered datum of
17 a current dot and a sum of errors from previous dots are added up
18 so as to render a corrected value of the current dot, and the
19 corrected value is sent to the latch (50) in which the corrected
20 value is divided into a first portion and a second portion, and the
21 first portion of the corrected value is sent to the LED printer head
22 (H) in order to control the on/off of the current LED, and the first
23 portion of the corrected value is sent to the error prediction block
24 (32), and the calibration value of the current LED is sent from the
25 calibration data memory (30) to the error prediction block (32) in
26 which a first error is estimated based on the first portion of the

1 corrected value and the calibration value, and the second portion
2 of the corrected value is taken as a second error and sent to the
3 second adder (17) in which the first and second errors are added
4 up so as to render a sum of errors, and the sum of errors is sent to
5 the first adder (15) for processing a next dot.

6 10. The LED printing system of claim 9 wherein the first portion of the
7 corrected value includes most significant bits ("MSB").

8 11. The LED printing system of claim 10 wherein MSB represents the
9 integer of the corrected value that will be realized by means of the
10 current LED.

11 12. The LED printing system of claim 9 wherein the first error is
12 estimated by means of a formula.

13 13. The LED printing system of claim 9 wherein the first error is
14 estimated by means of a lookup table.

15 14. The LED printing system of claim 9 wherein the calibration value of a
16 neighboring LED is also be taken into consideration in the estimation
17 of the first error.

18 15. The LED printing system of claim 1 including a dither block (12)
19 between the data source (S) and the printer controller (C).

20 16. The LED printing system of claim 15 wherein the printer controller
21 (C) includes:

- 22 □ a first adder (15) connected with the dither block (12);
- 23 □ a latch (50) connected with the first adder (15);
- 24 □ a second adder (17) connected with the latch (50) on one hand
25 and the first adder (15) on the other hand;
- 26 □ an error prediction block (32) connected with the latch (50); and

1 □ a calibration data memory (30) connected with the error
2 prediction block (32);
3 □ wherein source data are sent from the data source (S) to the dither
4 block (12) in which the source data are dithered, and the dithered
5 data are sent to the first adder (15) in which the dithered datum of
6 a current dot and a sum of errors from previous dots are added up
7 so as to render a corrected value of the current dot, and the
8 corrected value is sent to the latch (50) in which the corrected
9 value is divided into a first portion and a second portion, and the
10 first portion of the corrected value is sent to the LED printer head
11 (H) in order to control the on/off of the current LED, and the first
12 portion of the corrected value is sent to the error prediction block
13 (32), and the calibration value of the current LED is sent from the
14 calibration data memory (30) to the error prediction block (32) in
15 which a first error is estimated based on the first portion of the
16 corrected value and the calibration value, and the second portion
17 of the corrected value is taken as a second error and sent to the
18 second adder (17) in which the first and second errors are added
19 up so as to render a sum of errors, and the sum of errors is sent to
20 the first adder (15) for processing a next dot.

21 17. The LED printing system of claim 16 wherein the first portion of the
22 corrected value includes most significant bits (“MSB”).

23 18. The LED printing system of claim 16 wherein MSB represents the
24 integer of the corrected value that will be realized by means of the
25 current LED.

26 19. The LED printing system of claim 16 wherein the first error is

1 estimated by means of a formula.

2 20. The LED printing system of claim 16 wherein the first error is
3 estimated by means of a lookup table.

4 21. The LED printing system of claim 16 wherein the calibration value of
5 a neighboring LED is also be taken into consideration in the
6 estimation of the first error.

7 22. The LED printing system of claim 1 wherein the data source (S) is a
8 computer.

9 23. The LED printing system of claim 1 wherein the data source (S) is a
10 scanner.

11 24. The LED printing system of claim 1 wherein the LED printer head (H)
12 includes a dot controller (11) for receiving the processed data from
13 the printer controller (C) and an LED array (13) for printing under
14 control of the dot controller (11).

15 25. The LED printing system of claim 24 wherein the dot controller (11)
16 controls the on/off of each dot corresponding to every LED of the
17 LED array (13).

18 26. The LED printing system of claim 25 wherein the dot controller (11)
19 controls the size of every LED that is turned on.

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